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802.11a:

The Clear Choice for Wireless LANs

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Corporate Summary

This paper will explore the use of the latest wireless technology, the IEEE standard known as 802.11a, in providing fast, robust, and flexible wireless Local Area Networks that are inexpensive to install and maintain in corporate, government, medical, and educational environments. We will see how it differs from the 802.11b standard. We will enumerate its benefits compared to other connectivity solutions. And we will outline the security options for, and advantages of, wireless networks.

Although the 802.11a and 802.11b standards were established concurrently, 802.11b was first to market due to its simpler technical implementation. However, 802.11a, offering significant performance advantages, is now available to IT managers and organizations in need of robust high-speed wireless LANs. The advantages of the 11a standard include:

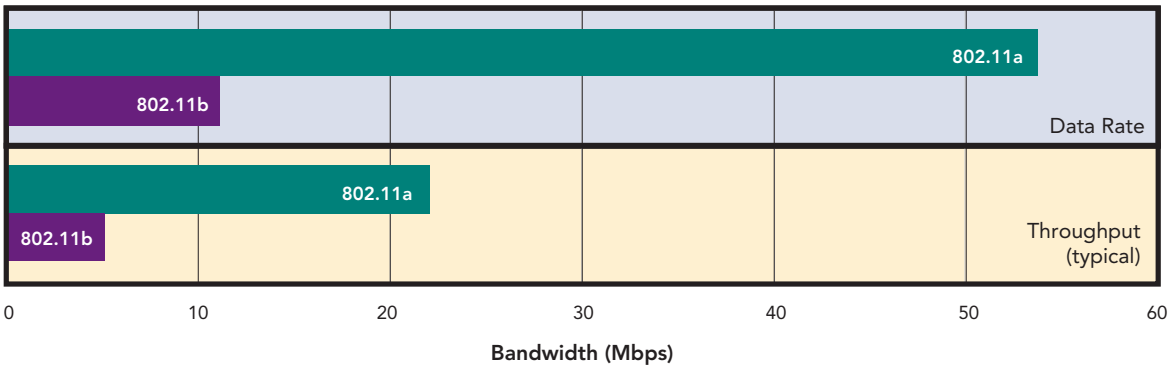
- Five times the speed
- Up to thirteen times more capacity
- Superior system reliability in the uncluttered 5 GHz band
- Worldwide availability
- Best network upgrade option
- Client compatibility with existing 802.11b installations

Together, these benefits make 802.11a the preferred wireless LAN solution for both those seeking the highest speed and capacity available in a new installation, and those seeking to expand existing networks while providing an easy migration to high-speed, high-capacity wireless LAN connectivity.

802.11a—five times faster.

The speed of network connections is a limiting factor for many, if not most, business applications. Connection speed determines how well an application functions within an organization, just as much or more so than processor speed. A 2.1 GHz desktop computer that exchanges data over a network via a 56K modem doesn't come close to its performance potential. And the productivity of employees on such a network, or even an 802.11b network connecting at up to 11 Mbps, is restricted.

802.11a is Faster than 802.11b



Today's business applications create very large data files. Applications such as spreadsheets, graphics programs, presentation software, CAD and others produce files that measure in megabytes. And if you, or your employees, are waiting for those files to be transferred via a network with "small pipes" your ability to do business is as constricted as those pipes.

Simply put, more speed allows greater productivity. And no business can afford to be at a productivity disadvantage.

At 54 Mbps, 802.11a is roughly five times as fast as 802.11b. This means that you can have more users per access point than you can with 11b. It also means that spreadsheets pop open, motion graphics glide effortlessly, and audio/video presentations retain all of their snap and pizzazz. In other words, applications work as they were intended to, and the enterprise works to its potential.

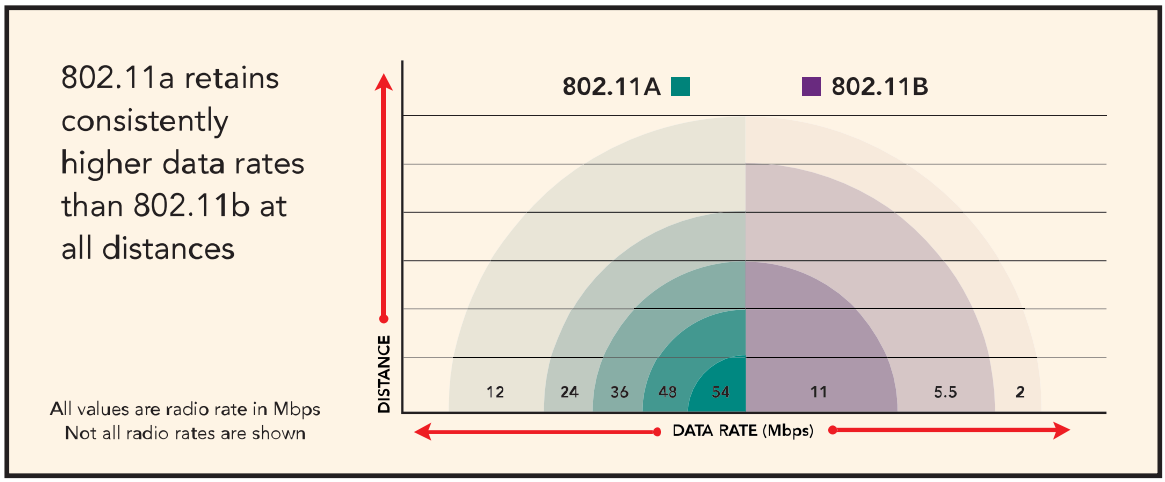
Another consideration in real-world comparisons between 802.11a and 802.11b is that although the speed of the connection decreases with distance from the access point under both standards, 802.11a is always, at every distance, faster than 802.11b. This distance/performance ratio shows that 802.11b requires a greater number of access points to effectively cover a given area under each standard, and a lower average connection speed available to users who are not in close proximity to an access point.

Those seeking the ultimate in wireless LAN speed will want to investigate the 2X mode from Proxim Corporation, which increases the distance/performance ratio. Although not officially specified in the 802.11a standard, 2X mode allows up to 108 Mbps connections.

802.11a—thirteen times the capacity of 802.11b networks.

Along with connection speed, capacity is the determining quality that can either inhibit or enable increased productivity. More capacity allows more users to access the power of network computing, i.e., access to databases, enterprise applications, and inter-activity with coworkers, wherever and whenever that power is needed. There is, however, a distinct difference between 802.11a and 802.11b in their ability to deliver network capacity via wireless.

802.11a is Faster than 802.11b at any Distance



The ideal wireless network consists of neighboring access points that operate on different channels. Using different channels allows workers to connect to the network without experiencing interference from other users or an unacceptable dilution of data rates. The greater the number of channels a network has, the less likely these problems will occur.

This is why it is difficult to scale an 802.11b wireless network because the 802.11b standard only has three channels. This means that, in a large deployment, it is likely that at least one access point with a competing channel will be installed next to another. This is especially problematic with networks in multi-story buildings because wireless signals radiate in all directions, not just horizontally.

In contrast, the 802.11a standard uses eight independent channels. These additional channels allow 802.11a networks to deliver up to 13 times more throughput than 802.11b networks with less interference—across floors and between them.

The numbers tell the tale. 802.11a is superior.

Device	802.11a	802.11b
Data Rate	Up to 54 Mbps 108 Mbps in Proxim 2X Mode	Up to 11 Mpbs
Spectrum	5.15 GHz to 5.35 GHz UNII spectrum	2.5 GHz spectrum
Channels	8 non-overlapping	3 non-overlapping
Maximum Distance	300ft.	300 ft.
Number of Users	Best suited for large numbers of users in enterprise environments	Best suited for a small number of users per access point
Application Suitability	Handles large files (i.e. CAD, PowerPoint) as well as streaming video	Works well for lower bandwidth applications such as Internet browsing and e-mail access

802.11a—less interference from other wireless devices.

Another reason for the superior performance of 802.11a is that it operates in the uncongested 5 GHz UNII band. In contrast, 802.11b operates in the highly congested 2.4 GHz ISM band. Wireless LAN-connected computers using 802.11b must compete with many other devices—including cordless phones, microwave ovens, and Bluetooth products—for connections in the same spectrum. This means that signals are sometimes not as clear and throughput can be diminished.

802.11a—a worldwide standard.

Multi-national corporations, governmental organizations, and others who require standardization of systems worldwide will be pleased to note that 802.11a has been certified in over 15 countries in North America including the United States, Canada and Mexico, in over 10 countries in Western Europe and in Japan. With more countries certifying every day, 802.11a is well on its way to being the global wireless LAN standard. With global certification, corporations will be able to deploy 11a in their offices around the world and their business travelers will be able to count on the best performing wireless LAN, 11a, no matter where they work.

802.11a—best migration path to higher speeds.

The advantages of 802.11a are numerous and obvious, but what of those corporations and institutions that have already adopted 802.11b? Can they easily migrate to high-speed, high-capacity 802.11a wireless LAN connectivity?

Fortunately, the answer is that not only is there an easy migration to fast, robust 802.11a networking, but that 11a and 11b will be able to peacefully co-exist within the same organization, with users seamlessly switching between systems as they roam.

802.11a is the easiest migration path to a higher speed wireless LAN because it operates in the uncongested 5 GHz frequency band. This means that it can be deployed alongside existing 802.11b installations without fear of interference.

Some well-read managers may be aware of another wireless standard under development called IEEE 802.11g that offers 54 Mbps speed. This standard is not ratified yet, so products are not yet available. The benefit touted with 11g is that it offers backwards compatibility with existing 11b systems.

The downside to 11g is that it uses the same frequencies and same three channels as 802.11b in the 2.4 GHz band. The result is interference between 11b and 11g systems, making them incompatible such that 11g cannot be deployed simultaneously with an existing 11b network. This prevents network managers from adding users who need higher speeds without first removing the entire original 11b network, even if low speed users will continue to work wirelessly with their 11b client cards.

802.11a—achieving backwards compatibility with 802.11b networks.

While others may agree that 11a is a simpler migration to higher speed, they may wonder about compatibility with 11b systems in other places. How do I connect to 11a at the office, and also connect simply and easily to 11b networks at home or in public hot spots at airports or cafes? Fortunately the answer to this question is not to carry two wireless cards—an inconvenient solution at best. Dual-mode 802.11a/b client cards are already in the pipeline ready for deployment. These cards function just as current laptop wireless networking cards do, but have the ability to detect the wireless standard in use and automatically switch to that system. When a user walks from an 802.11b cell to an 802.11a cell the card "sees" which system to use and makes the adjustment on the fly.

Not only does that resolve any system conflicts on a campus (let's say the engineering department uses 802.11a, but marketing uses 802.11b), it also allows users with home wireless LANs (typically using 802.11b) to connect to their wireless LAN at work (using high-speed 802.11a). It also means universal compatibility for public hot spot users. Users with dual-mode cards can connect to wireless LANs wherever they go.

The bottom line is that 802.11a not only allows greater speed and capacity, but because it is backwards compatible with existing 802.11b systems, 802.11a protects the technology investment in existing WLANs.

Harmony 802.11a—the best enterprise solution on the market.

Though, like 802.11b, 802.11a is a worldwide standard, not all 11a solutions are equal. There are differences in security, distance, and functionality that can affect the choice of a particular solution. Harmony 802.11a is the leading enterprise solution available today and has important advantages over its competitors.

"We consider Proxim's Harmony the most appropriate 11a access point for deployment in the enterprise…Harmony's transmission range far exceeded that of its rivals…Proxim's two-tier hardware architecture uses clusters of access points connected to APCs (Access Point Controllers). This design is unique in the WLAN industry and allows for centralized configuration and management of both 11a and hybrid 11a/11b/OpenAir networks while enhancing roaming capabilities."

Dave Molta, Network Computing (2/24/02)

Harmony 802.11a—industrial strength privacy and authentication.

Security issues—privacy, authentication, and data integrity—are more important today than ever. A wireless LAN that does not adequately address these issues is an open door to the enterprise. Fortunately, 802.11a is easily configured to provide optimum security.

Network administrators using 802.11a have all of the most advanced data encryption and authentication techniques at their disposal in order to secure the network. Systems from Proxim Corporation are noteworthy for their enterprise-class security advantages. Passive eavesdropping and brute force attacks due to weaknesses in Wired Equivalent Privacy (WEP) are blocked. And unauthorized network access, a problem for systems using MAC addresses for access control, is foiled.

Proxim 802.11a solutions support IEEE 802.1x with dynamic per user, per session re-keying and RADIUS-based authentication. This standards-based solution authenticates via existing databases and provides the best scalability for large enterprise deployments. For smaller enterprise deployments, Proxim's built-in VPN tunnel allows administrators to utilize existing VPN servers to secure their wireless network, saving cost and complexity. Whichever method is chosen, 802.1x or a VPN, you can be assured of a secure, private 802.11a network. In addition, future 802.11i solutions promise even stronger encryption yet based on TKIP and AES standards. Proxim Corporation products will support those standards as they become available. Proxim is already the first 802.11a manufacturer to support 802.1x technology in its products.

"With the Harmony architecture, users can roam subnets without any difficulty, which is not possible with most WLAN implementations…Proxim's Harmony allows 802.11b, 802.11a, and OpenAir wireless devices to coexist and interoperate on the same network. That means end-users can communicate with each other, regardless of what kinds of devices they use, and all devices can be centrally managed form a (single) web interface. Best of all, Harmony does not require that any additions be made to the network."

Mandy Andress, InfoWorld (2/1/2002))

InfoWorld

Harmony 802.11a—built-in manageability.

Although wireless connectivity frees the user to access the network when and where he or she chooses, it poses a challenge to administrators. How does one deal with many users, each capable of moving their physical location, roaming across subnets in typical enterprise networks? The answer is found in 802.11a implementations such as those from Proxim Corporation that allow administrators to deploy wireless LANs easily within the existing routed network without setting up a single VLAN or subnet for the wireless access points.

The Proxim 802.11a solution is unique in that it offers an optional Access Point Controller. This device, housed in the server room, allows the network administrator to control all access points in the network from a single central monitoring station. The Access Point Controller greatly simplifies installation by configuring APs automatically, it enhances security with a built-in VPN tunnel and IP firewall, and it lets wireless devices roam across subnets without any special software required on the client or the network.

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Best Wireless Networking System

Summary—802.11a faster, better, and smarter.

The reasons to choose a wireless LAN using 802.11a over 802.11b or a hard-wired network are many, but IT managers and others involved in the selection process should keep the following in mind:

- 802.11a, with 54 Mbps, has the speed enterprises need to connect more users and provide greater bandwidth for data-intensive applications.
- 802.11a, with eight non-overlapping channels, provides more capacity, is highly scaleable, and less prone to interference. 802.11a operates in the uncongested 5 GHz UNII band and is backwards compatible with 802.11b.
- 802.11a, already certified in the U.S. and 14 other countries, is becoming the new worldwide standard for large-scale enterprise deployments.
- Harmony 802.11a from Proxim, with its superior security, distance, and management functionality, has been identified as the best solution on the market today.

Choose the Wireless Experts

When you do choose to install a 802.11b or 802.11a wireless network, be sure to consult with the recognized expert in the field, Proxim Corporation. The company was created by a merger of Proxim, Inc. and Western Multiplex Corporation, both well-known leaders in wireless technology.

The new company combines Proxim's many years of experience in fixed, high-capacity wireless WAN solutions with Proxim's expertise in wireless LANs. The result is a product line that serves every need for wireless connectivity—from small office/home office solutions to telco backhaul operations.

In fact, Proxim is the only company that can deliver both high capacity wireless indoor LAN and wireless outdoor WAN solutions. Moreover, Proxim provides wireless LAN solutions for both Windows (98, SE, 2000, ME, XP) and Macintosh operating systems. They even offer a developer's kit for other popular operating systems.

Beyond offering the most complete wireless product line, Proxim also has the people to advise you on any technical or operational questions you might have regarding wireless. They can share their knowledge with you on how to initiate a wireless system, how to expand your present system, how to migrate to 802.11a from 802.11b, how to integrate Mac and PCs within a single network, and how to increase your business productivity through the use of wireless LANs. They can also show you how to connect individual wireless LANs between buildings with their high-capacity fixed wireless products.

Proxim is the leader in wireless technology and should be your first call when considering a wireless LAN or upgrade of an existing wireless network.

Proxim Corporation
935 Stewart Drive
Sunnyvale, California 94085

tel: 800.229.1630
tel: 408.731.2700
fax: 408.731.3675

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